

## ELECTRIC MOTOR-DRIVEN PUMP

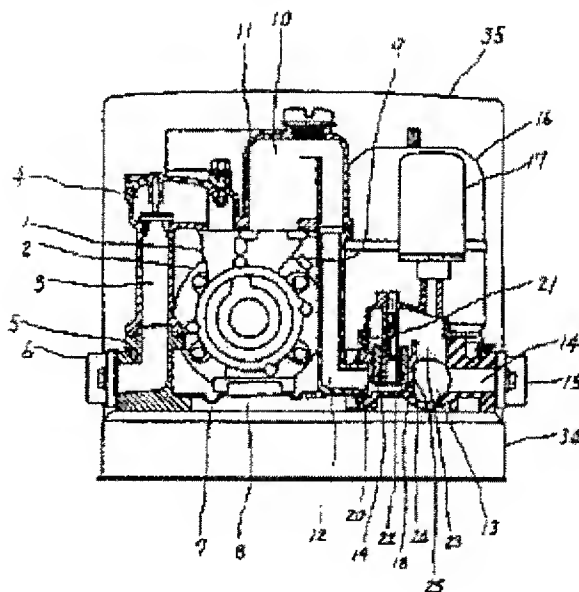
Publication number: JP63192996  
Publication date: 1988-08-10  
Inventor: NISHIMURA SHUNICHI; TANABE MASATOSHI  
Applicant: HITACHI LTD  
Classification:  
- international: F04D29/58; F04D29/58; (IPC1-7): F04D29/58  
- European:  
Application number: JP19870024555 19870206  
Priority number(s): JP19870024555 19870206

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### Abstract of JP63192996

**PURPOSE:**To improve low temperature resistance of the pump in the caption so as to aim at improvement in reliability of the electric pump by providing, in the neighborhood of the pump a heater for increasing the temperature in a protecting cover through a temperature sensing switch for detecting the temperature of a motor at a lot temperature.

**CONSTITUTION:**Pumping system appliances consisting of a storage pump 1 directly connected to an electric motor 2, a suction pipe 3, a non-return valve 4, a pressure chamber 11, a delivery pipe 13, an accumulator 16, a pressure switch 17 and a flow switch 18 are installed on the same base 34 and the upper portion of the appliances is protected with a protecting cover 35. And, a temperature sensing switch 9 for detecting the temperature of the motor 2 and a ceramic heater 7 held by a holding member 8 are provided for increasing the temperature in the protecting cover 35 by a closing the temperature sensing switch 9 to send an electric current to the heater 7 at a low temperature. And, a gap is formed between a delivery valve 13 and the base 34 to insulate the heat conduction from the base 34. Thereby, the improvement in cold temperature resistance is aimed and the electric pump can be stably and reliably operated.



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エネルギーを計ることができる。

電動機2を停止させた場合もその直後は予熱によりポンプケーシング1は保温されているので、電動機が停止しても直ちに発熱体を動作させる必要はない。このような場合を考慮して感温スイッチ9は電動機2のステータコイルに近いハウジング面に設置され、電動機2が完全に冷却したときに動作するようになっているので、感温スイッチ9、すなわち発熱体7を確実に動作させることができる。

以上、本実施例を用いることにより次のような効果が得られる。

- (1) 寒冷時に水が凍結してポンプが故障する恐れがあるとき、発熱体を動作させて凍結を防止しポンプを安定に稼動させることができる。
- (2) 吐出管とベースとの間に空隙を設け、吐出管よりベースに放散する熱の移動を遮断してポンプ系の早期凍結を防止することができる。

〔発明の効果〕

本発明によれば、耐寒性が向上し、高信頼性の

電動ポンプを提供することができる。

#### 4. 図面の簡単な説明

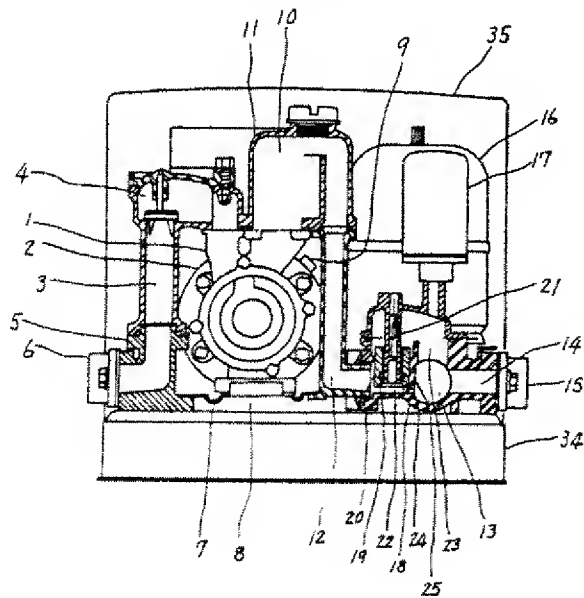
第1図は本発明の電動ポンプの一実施例の正面図、第2図は同じく側面図、第3図は同じく斜視図、第4図は電動機駆動回路図、第5図は動作説明図である。

1…ポンプケーシング、2…電動機、3…吸水管、4…逆止弁室、7…発熱体、8…支持体、9…感温スイッチ、11…圧力室、16…蓄圧装置、17…圧カスイッチ、18…流量スイッチ、26…吐出管、34…ベース、35…保護カバー。

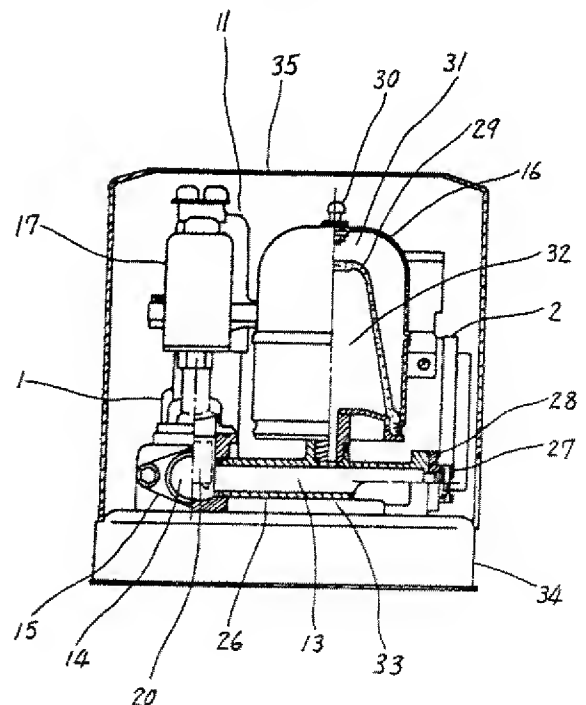
代理人 弁理士 小川勝男



第1図



第2図



## PATENT ABSTRACTS OF JAPAN

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(51)Int.Cl.

F04B 41/02

F04B 39/00

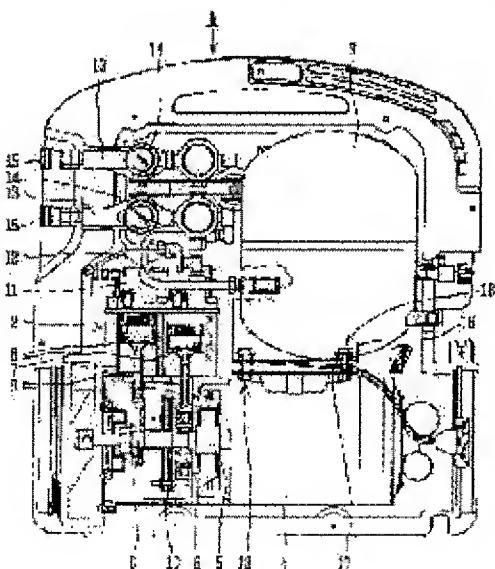
(21)Application number : 08-055170

(71)Applicant : MAX CO LTD

(22)Date of filing : 12.03.1996

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NAITO YASUHIRO  
MURAYAMA KATSUHIKO

### (54) AIR COMPRESSOR



#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To try to reduce noises of an air compressor.

**SOLUTION:** An air tank 3 is linked to a base frame 17 via an dynamic damping mechanism 18 due to a compression coil spring. A resonance frequency  $F_0$  of the air tank is equal to the vibration frequency of a compressor unit 2 by setting the mass of the air tank 3 and the constant of the compression coil spring. The air tank 3 is resonated in the reverse phase to the compressor unit 2 due to the vibration generated during actuation of the compressor unit 2. The inertial force of the air tank acts to the compressor unit 2 via the spring of the dynamic damping mechanism, and the vibration of the entire compressor 1 is restricted.

#### LEGAL STATUS

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than the examiner's decision of rejection or  
application converted registration]

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[Patent number] 3180656

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examiner's decision of rejection]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001] [**Field of the Invention**] This invention relates to the air compressor which the oscillation was reduced and formed it into the low noise especially about an air compressor.

[0002] [**Problem(s) to be Solved by the Invention**] A portable mold air compressor is combined in [ a compressor unit and an air receiver ] one, and the high voltage air breathed out from the compressor unit driven with a motor or an engine is stored in an air receiver.

[0003] Although the reciprocating form compressor unit is generally carried, especially, the compressor unit with larger discharge quantity of an oscillation and the noise is larger, and, as for the air compressor used for a pneumatic tool etc., low noise-ization is demanded. Then, the technical technical problem which should be solved in order to offer the air compressor of the low noise arises, and this invention aims at solving the above-mentioned technical problem.

[0004] [**Means for Solving the Problem**] In the air compressor which proposes this invention in order to attain the above-mentioned object, and carried the air receiver and the compressor unit which carries out compression restoration of the air into said air receiver While connecting the delivery of said compressor unit, and the bleeder of an air receiver with a flexible hose An air receiver is combined free [ a slide ] through a slide guide device to a compressor unit. The dynamic-vibration-absorption device which infixed means from a cartridge, such as combination of a spring or a magnet, in the slide direction order both sides of said air receiver, and stabilized said air receiver in the mid-position of the slide range is formed. The air compressor characterized by setting up almost equally to the fundamental frequency of the oscillation in which said compressor unit generates the resonance frequency of said dynamic-vibration-absorption device is offered.

[0005] **[Embodiment of the Invention]** Hereafter, one gestalt of implementation of this invention is explained in full detail according to drawing. Drawing 1 shows an air compressor 1 and is constituted by the compressor unit 2 and air receiver 3 of an electric form. The compressor unit 2 is the reciprocation form compressor which connected the eccentric shaft 6 attached in the revolving shaft 5 of a motor 4, and the piston 8 inserted in the cylinder 7 with the connecting rod 9, and the balance weight 10 for maintaining the mass balance of a revolution system is attached in the eccentric shaft 6 of a motor 4.

[0006] The delivery of a discharge valve 11 established in the crowning of a cylinder 7 and the bleeder of an air receiver 3 are connected by the flexible hose 12. Moreover, the pneumatic pressure regulator 14 is inserted in the duct 13 which branched from the delivery of a discharge valve 11, and the high voltage air which connected the air hose to the coupler 15 with which the edge of a duct 13 was equipped, and controlled the pressure to the pneumatic tool etc. is supplied.

[0007] An air receiver 3 fixes on the tank support frame 16, and the tank support frame 16 is combined through the dynamic-vibration-absorption device 18 with a spring to the base frame 17 which fixed to the compressor unit 2.

[0008] Drawing 2 shows the dynamic-vibration-absorption device 18, the guide shaft 19 set up on the base frame 17 is inserted in the hole established in the tank support frame 16, and compression springs 21 and 22 are infixed, respectively between the end plate 20 with which it equipped at the head of the guide shaft 19 between the base frame 17 and the tank support frames 16, and the tank support frame 16. The tank support frame 16 is stable in the mid-position of the guide shaft 19 where it is pressed by compression springs 21 and 22 from the movable direction order both sides, and the resiliency of order both sides is balanced.

[0009] Sum total mass  $m_0$  of the moving part which consists of an air receiver 3 and a tank support frame 16 Load rate  $k_0$  of compression springs 21 and 22 Resonance frequency  $f_0$  of moving part determined It is expressed with a degree type.

[0010]  $1/2\pi\sqrt{k_0 / m_0} = f_0$  (Hz)

Supposing the rotational frequency of the motor 4 of the compressor unit 2 is 1440rpm=24Hz and is mass  $m_0=4\text{kg}$  of an air receiver 3 and the tank support frame 16 here, it will be referred to as  $f_0=24\text{Hz}$  as load-rate  $k_0=9.2\text{kgf}$ , and it is the resonance frequency  $f_0$  of moving part. It has set up equally to the fundamental-vibration frequency of the compressor unit 2.

[0011] When the acceleration of the direction of a guide shaft of a dynamic-vibration-absorption device is zero as generally known, if moving part is standing it still in the mid-position of a guide shaft and acceleration is added, moving part will start migration along with a guide shaft. Therefore, an air receiver 3 and the tank support frame 16 vibrate by the oscillation generated at the time of actuation of the compressor unit 2, when it is resonance frequency  $f_0=24\text{Hz}$ , the oscillating phase of an air receiver 3 and the compressor unit 2 shifts 180 degrees, and the amplitude of an air receiver 3 also becomes

max. At this time, the inertia force of an air receiver 3 and the tank support frame 16 acts on the compressor unit 2 through compression springs 21 and 22 and the guide shaft 19, reduces the inertia of the compressor unit 2, and controls the amplitude. Furthermore, the fundamental-vibration frequency of the compressor unit 2 = when a 24Hz oscillation declines, a high order higher-harmonic oscillation (48Hz, 72Hz, ....) is also decreased.

[0012] In addition, a dynamic-vibration-absorption device can apply various formal things in addition to what used the metal spring, and shows the operation gestalt which used the magnet for drawing 3. This drawing fixes magnets 24, 25, and 26, respectively on the both ends and the tank support frame 16 of the guide shaft 23 which were set up on the base frame 17, makes the south pole of the magnet 24 at the head of the guide shaft 23 counter the south pole of the magnet 25 of a tank support frame, and makes N pole of the magnet 26 of the base of the guide shaft 23 have countered N pole of the magnet 25 of the tank support frame 16. The tank support frame 16 is stabilized in the mid-position of the guide shaft 23 according to the repulsive force of line of magnetic force, and the same damping operation as the dynamic-vibration-absorption device 18 shown in drawing 2 is demonstrated at the time of an oscillation of the compressor unit 2.

[0013] In addition, although the damping effectiveness will go up if the both-way direction of a piston 8 and the oscillating direction of the dynamic-vibration-absorption device 18 which are generally an oscillating source of release are made to agree, it should not limit to this, but the oscillating direction and amplitude of the compressor unit 2 should be analyzed, and it should opt for arrangement of the most effective dynamic-vibration-absorption device. Moreover, two or more dynamic-vibration-absorption devices are arranged with a rectangular position, and if it forms so that the oscillation of the XY direction of an air receiver 3 or the XYZ direction may be braked, the damping effectiveness will improve further.

[0014] In addition, this invention is not limited to the above-mentioned operation gestalt, various alterations are possible within the limits of [ technical ] this invention, and, naturally this invention reaches at those changed things.

[0015] **[Effect of the Invention]** As explained above, since the air compressor of this invention infixed the absorption device which supported the air receiver with the spring and set up the resonance frequency of an air receiver almost equally to the oscillation frequency which a compressor unit generates, an oscillation of an air compressor is braked by the air receiver, the noise falls to an oscillating list remarkably, and it demonstrates effectiveness to an improvement of work environment. Moreover, since it damps using the mass of an air receiver, unlike what added the damping device by the spindle, a damper, etc. specially, the weight or the dimension of an air compressor are not enlarged and portability is not reduced.

## CLAIMS

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### [Claim(s)]

**[Claim 1]** In the air compressor carrying an air receiver and the compressor unit which carries out compression restoration of the air into said air receiver While connecting the delivery of said compressor unit, and the bleeder of an air receiver with a flexible hose An air receiver is combined free [ a slide ] through a slide guide device to a compressor unit. The dynamic-vibration-absorption device which infixed means from a cartridge, such as combination of a spring or a magnet, in the slide direction order both sides of said air receiver, and stabilized said air receiver in the mid-position of the slide range is formed. The air compressor characterized by setting up almost equally to the fundamental frequency of the oscillation in which said compressor unit generates the resonance frequency of said dynamic-vibration-absorption device.

## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] the operation gestalt of this invention -- being shown -- some air compressors -- it is a notching front view.

[Drawing 2] Description drawing of a coil-spring form dynamic-vibration-absorption device.

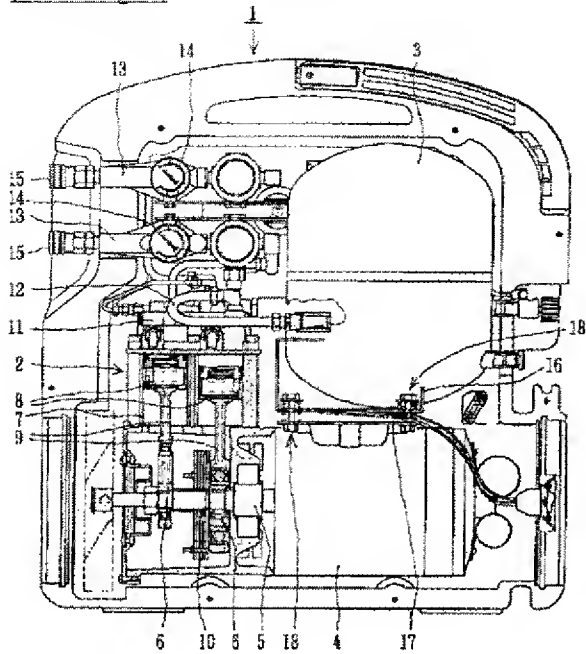
[Drawing 3] Description drawing of a magnet form dynamic-vibration-absorption device.

### [Description of Notations]

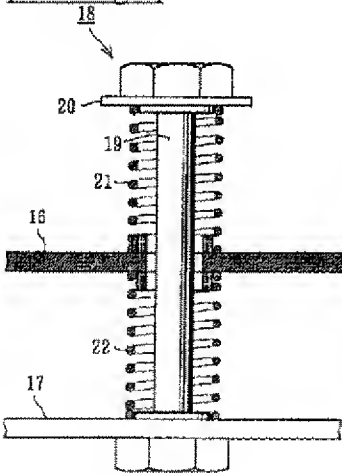
- 1 Air Compressor
- 2 Compressor Unit
- 3 Air Receiver
- 12 Flexible Hose
- 16 Tank Support Frame
- 17 Base Frame
- 18 Dynamic-Vibration-Absorption Device
- 19 Guide Shaft
- 21 22 Compression spring
- 23 Guide Shaft
- 24, 25, 26 Magnet

## DRAWINGS

[Drawing 1]

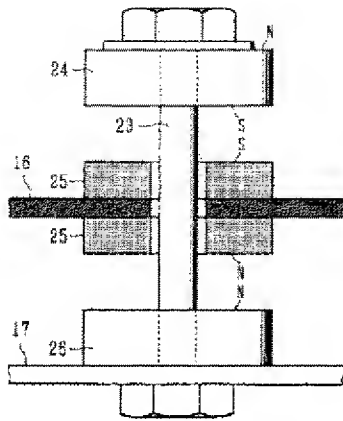


[Drawing 2]



[Drawing 3]





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(12) 公開特許公報 (A)

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特開平9-250456

(43) 公開日 平成9年(1997)9月22日

(51) Int.Cl. <sup>6</sup>	識別記号	庁内整理番号	F I	技術表示箇所
F 0 4 B 41/02			F 0 4 B 41/02	A
39/00	1 0 2		39/00	1 0 2 N

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(71) 出願人 000006301

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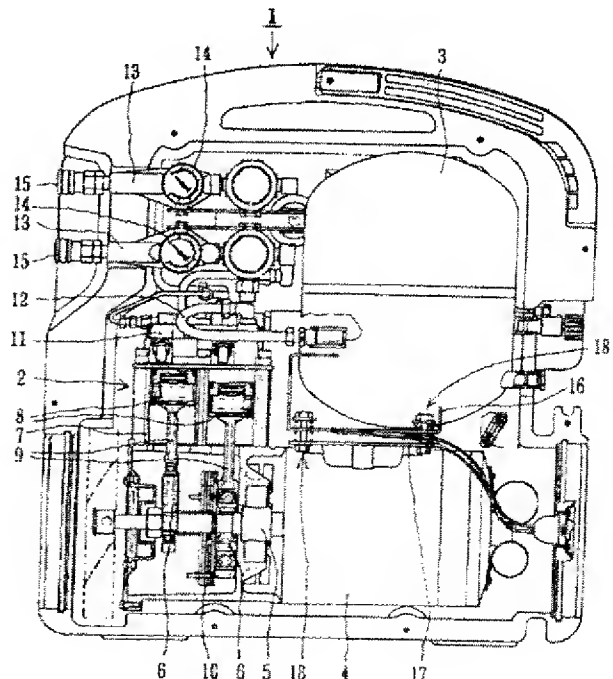
(74) 代理人 弁理士 林 孝吉

(54) 【発明の名称】 エアコンプレッサ

(57) 【要約】

【課題】 エアコンプレッサの低騒音化を図る。

【解決手段】 空気タンク3を、圧縮コイルバネによる動吸振機構18を介してベースフレーム17へ結合する。空気タンク3の質量と圧縮コイルバネの定数設定によって空気タンクの共振周波数 $f_0$ をコンプレッサユニット2の振動周波数と等しくする。コンプレッサユニット2の作動時に発生する振動によって空気タンク3がコンプレッサユニット2とは逆位相で共振する。空気タンクの慣性力が動吸振機構のバネを介してコンプレッサユニット2に作用し、エアコンプレッサ1全体の振幅を抑制する。



# AIR COMPRESSOR

Publication number: JP2003254241

Publication date: 2003-09-10

Inventor: KANEMOTO YOSHIYUKI

Applicant: TOKICO LTD

Classification:

- international: **B25F5/00; F04B39/06; F04B39/12; F04B39/16; F04B41/02; B25F5/00; F04B39/06; F04B39/12; F04B39/16; F04B41/00; (IPC1-7): F04B39/12; B25F5/00; F04B39/06; F04B39/16; F04B41/02**

- European:

Application number: JP20020051806 20020227

Priority number(s): JP20020051806 20020227

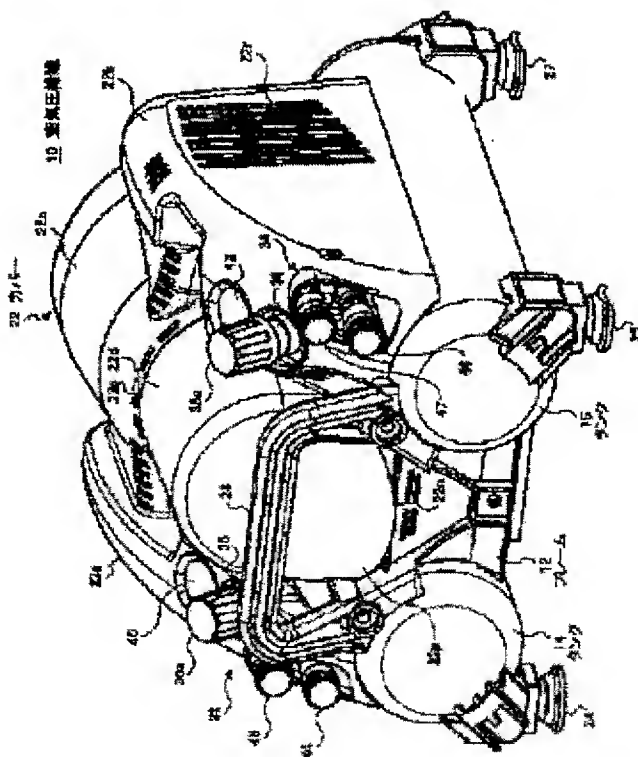
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## Abstract of JP2003254241

**PROBLEM TO BE SOLVED:** To prevent foreign matters in the air from adhering to a driving part.

**SOLUTION:** In an air compressor 10, a pair of tanks 14 and 16 formed into cylindrical shapes are supported in parallel on a frame 12, and an air compressing part 18 to generate compressed air and the driving part 20 to drive the air compressing part 18 are mounted on upper parts of the tanks 14 and 16. Further, an integrally formed resin cover 22 is mounted on the upper parts of the tanks 14 and 16 to cover the air compressing part 18 and the driving part 20. The cover 22 has a second air introduction port 22n to introduce air flow to cool the driving part 20 on a lower surface side. Even if wood shavings and wood flour float in the air around the air compressor 10, a possibility that the wood shavings and wood flour are sucked into the air introduction port 22n opened on a lower surface side is reduced, entering of dust into the driving part 20 is prevented, and a motor 68 of the driving part 20 is prevented from having a defective operation by the foreign matters.

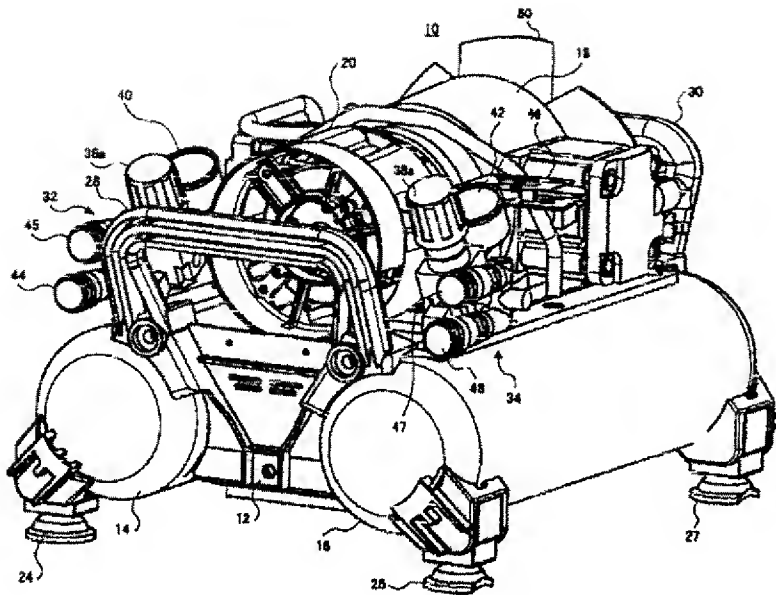
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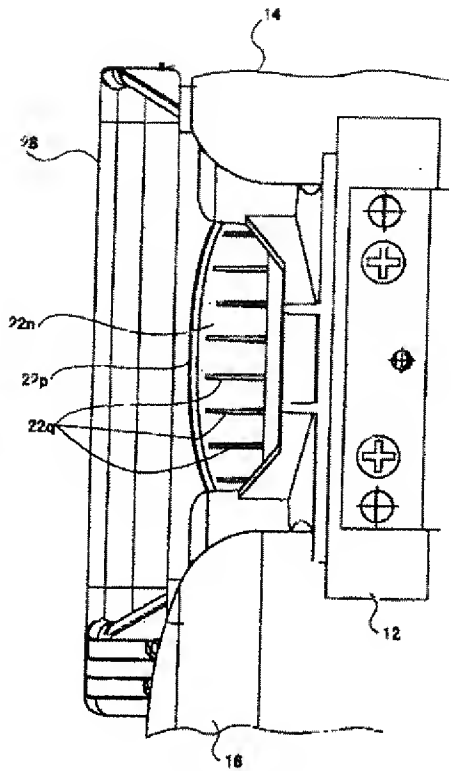
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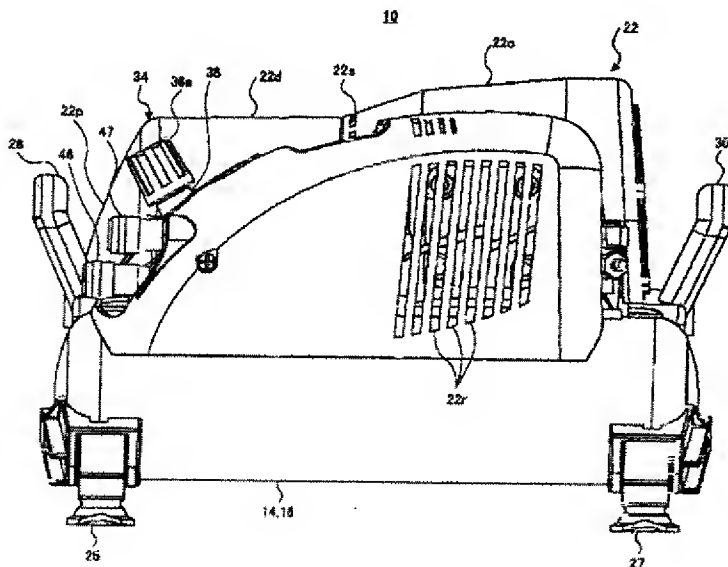
【図2】



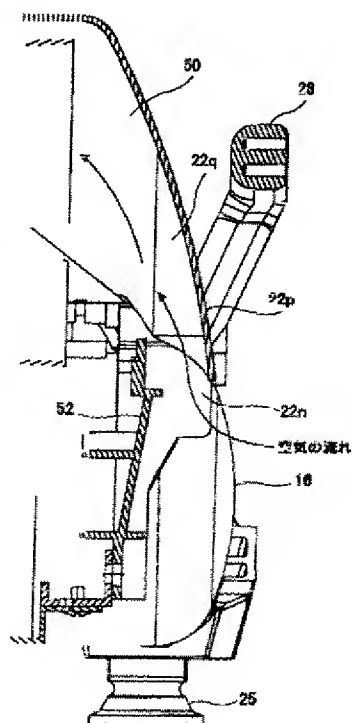
【図10】



【図3】



【図11】



# AIR COMPRESSOR

Publication number: JP2004036487

Publication date: 2004-02-05

Inventor: KANEMOTO YOSHIYUKI; HORI TAKASHI

Applicant: TOKICO LTD; AICHI ELEC CO

Classification:

- international: **F04B49/06; F04B41/02; F04B49/06; F04B41/00;** (IPC1-7): F04B49/06; F04B41/02

- European:

Application number: JP20020194616 20020703

Priority number(s): JP20020194616 20020703

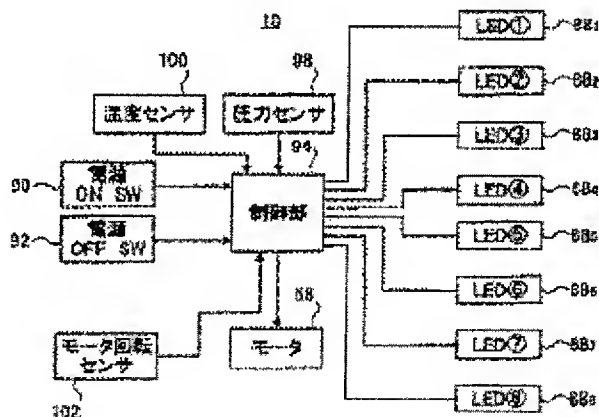
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## Abstract of JP2004036487

PROBLEM TO BE SOLVED: To relieve a motor from burden at starting operation, depending on pressure in a tank.

SOLUTION: This air compressor 10 comprises a control part 94 having operation stop means for stopping the energization of the motor 68 when the rotating speed of the motor 68 is a preset value or lower and stop means for stopping the energization of the motor 68 until the pressure in the tank is lower than a preset value when the pressure in the tank is determined to be the preset value or higher. The control part 94 therefore stops the energization of the motor 68 after determining a lack of torque due to voltage drop when the motor speed is the preset value or lower and stops the energization of the motor 68 until the pressure in the tank is lower than the preset value when the pressure in the tank is the preset value or higher, thereby preventing the unreasonable drive of the motor 68 in the state that there is sufficient pressure in the tank.

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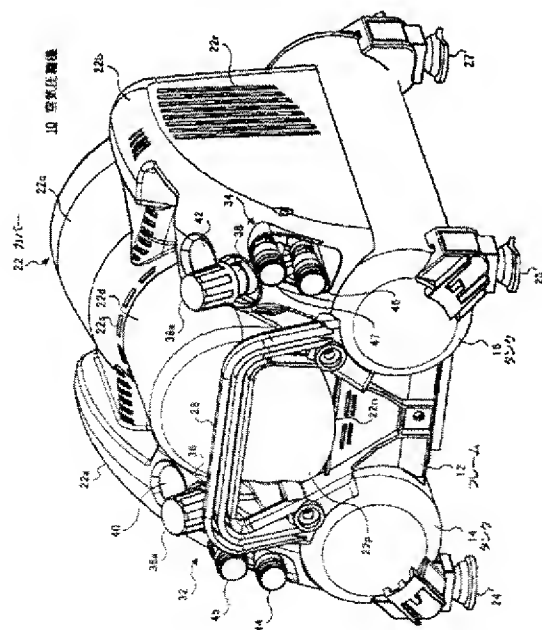
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- 32、34 空気吐出部
- 36、38 圧力調整弁
- 40、42 圧力計
- 44～47 吐出口
- 48 操作パネル
- 60 ケーシング
- 62、64 ピストン・シリンダ機構
- 66 フィルタ
- 68 モータ
- 79 モータカバー
- 80 第1のファン
- 82 第2のファン
- 88<sub>1</sub>～88<sub>8</sub> 圧力表示用赤色LED
- 88<sub>7</sub> 通電表示用赤色LED
- 88<sub>8</sub> 運転状態表示用緑色LED
- 90 電源ONスイッチ
- 92 電源OFFスイッチ
- 94 制御部
- 96 メモリ
- 98 圧力センサ
- 100 温度センサ
- 102 モータ回転センサ

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【図1】



【図2】

